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(56) Documents Cited
GB 2359404 A
JP 010185996 A
US 5158347 A
US 3682113 A
US 2730053 A
JP 030245292 A
US 5802991 A
US 3963900 A
US 3390833 A

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(54) Abstract Title
Secure powered drawer with timed opening and opening speed controls

(57) The powered draw 10 is opened by the input of a secure input code or operation sequence. The drawer might also have a time delay means that automatically closes the drawer after a set time. Also provided is means 14 to control the speed of the drawer, by detecting the load in the drawer and as such adjusting the power to the motor 16, and by means of a user operable means 12. The main embodiment of the drawer is in cash service points for notes and coins.

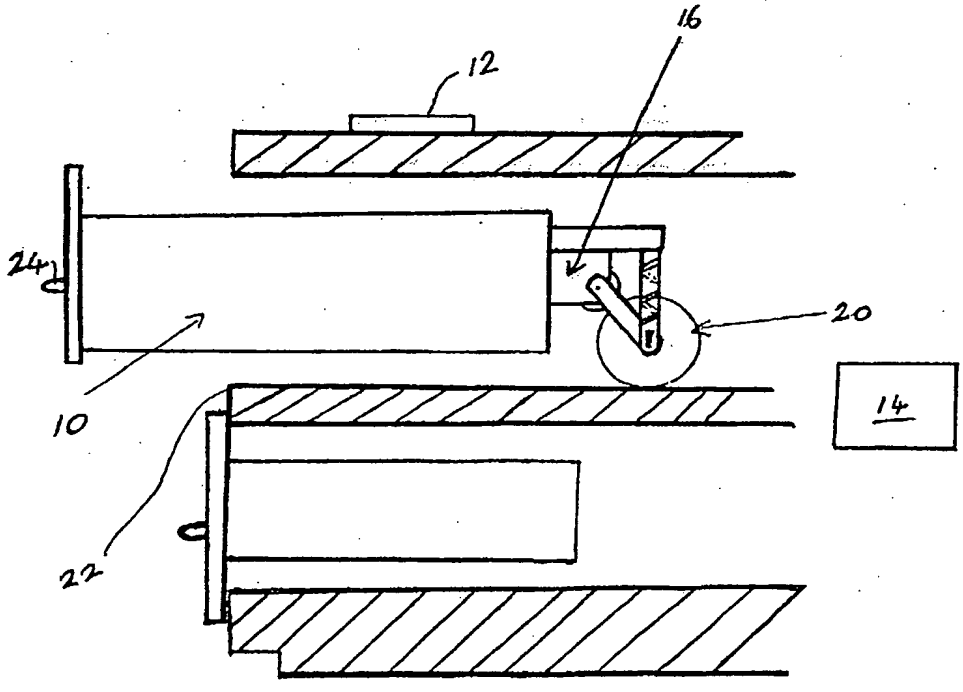

FIGURE 1

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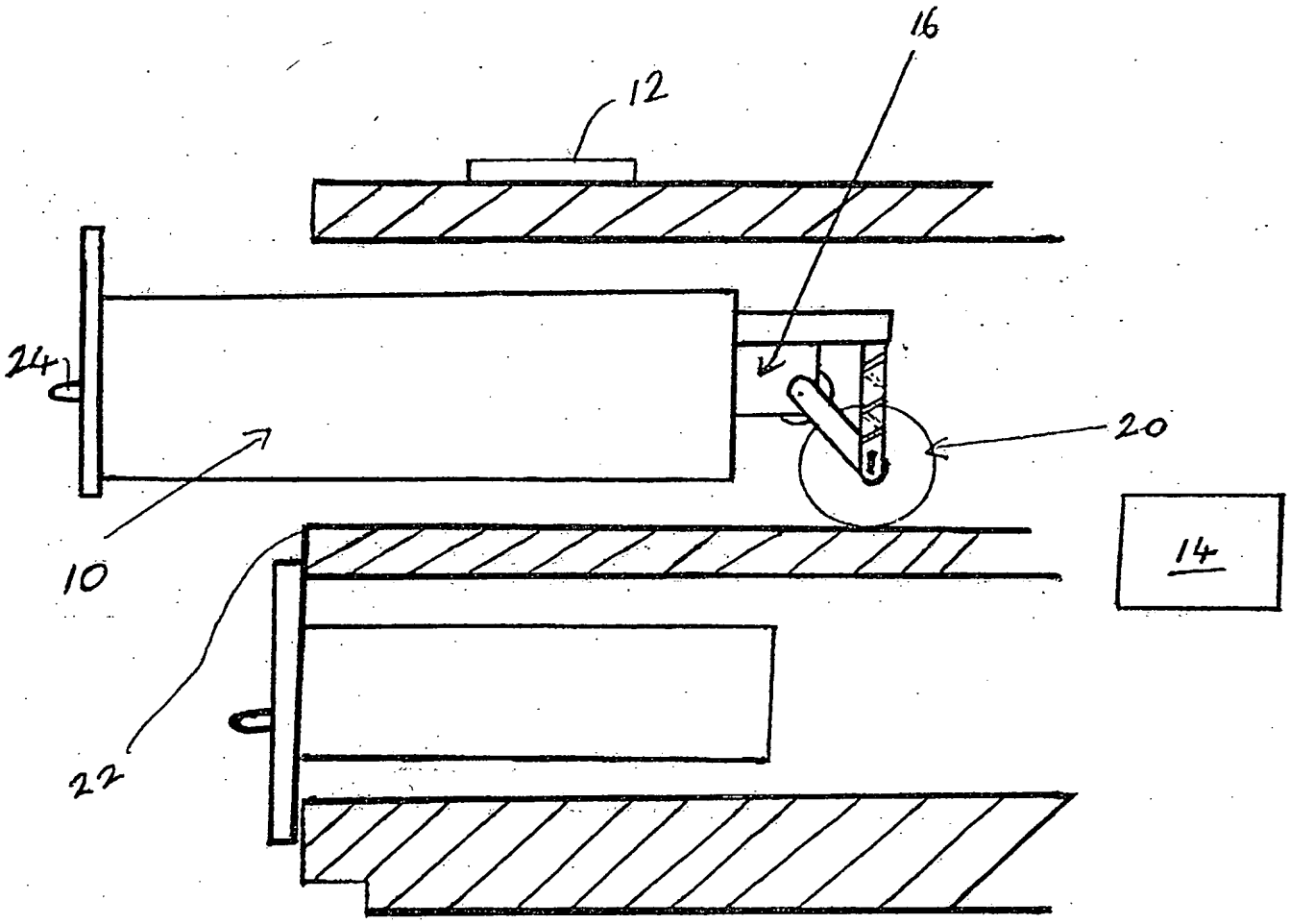

FIGURE 1

DRAWER ASSIST MECHANISM

The present invention relates to a drawer assist mechanism, in the preferred embodiment intended to address health and safety issues surrounding the opening and closing of drawers in general, particularly cash drawers and filing cabinet drawers.

Repeated opening and closing of drawers can cause upper arm and shoulder strain. This is particularly true when performed from a seated position. The situation is aggravated when there is a significant load in the drawer and so the force required to overcome the drawer's inertia becomes significant. In addition, most drawer slides currently in manufacture incorporate a rubber or plastic catching arrangement which prevents drawers from bouncing out of the cabinet when the drawers are slammed. The resistance of this arrangement has to be overcome before the drawer can be opened. This increases the risk of arm and shoulder injury to the user. There is the added risk of back injury if the drawer is low in the cabinet.

The problem, evidently, becomes most acute in situations where the drawer is accessed on a regular basis, such as by a bank cashier and the like.

The present inventions seeks to provide an improved drawer mechanism.

According to an aspect of the present invention, there is provided a drawer mechanism including a drawer unit for storage of items, a drawer housing within which the drawer unit can slide reciprocably, a motor coupled to the drawer unit and operable to slide the drawer unit reciprocably within the housing, and a control unit coupled to the motor and operable to actuate motor upon receipt of a predetermined input command.

The predetermined input command may, for example, be a secure command representative of receipt of an acceptable control input such as a predetermined code or operation sequence.

There may be provided a time delay and/or timed opening after which the drawer is closed again for security purposes.

In one embodiment, the speed of opening and/or closing of the drawer unit can be adjusted.

Preferably, the control mechanism includes means for detecting loading of the drawer and for adjusting power to the motor on the basis thereof. The load detection could be achieved by a variety of mechanisms, for example by measuring current draw of the motor, motor speed, drawer weight and so on. The adjustment of power may, for example, be effected by increasing current or voltage to the motor.

According to another aspect of the present invention, there is provided a cash service point including a drawer mechanism as herein specified, the drawer unit being designed to hold cash in note and/or coin form.

The described embodiments are intended to reduce or eliminate the risks highlighted above with respect to prior art drawers, by the incorporation of a drawer assist mechanism motorising the action of the drawer.

This unit could be used on new drawer units or retrofitted to modify existing drawers.

Embodiments of the present invention are described below, with reference to the sole Figure, which shows in schematic form and example of motor assisted drawer unit.

Referring to the Figure there is shown a part of an example of cashier's workstation, of the type which may be found, for example, in a bank. The workstation includes a plurality of drawers 10 typically for holding currency notes and other valuable papers. Such drawer units are generally conventional and are typically provided with security mechanisms such as delayed access, timed opening, coded access and the like.

The drawers of the embodiment of workstation shown are motorised (only the top drawer being shown as such but in practice more or all of the drawers will be motorised) to assist the operator and to reduce operator strain. To this end, a motor 16 is located behind the drawer 10 and drives a rubber wheel 20. The rubber wheel 20 moves along the lower surface of the drawer housing 22.

The motor 16 is reversible to allow for motorised opening and closing of the drawer.

Control of the motor 16 is provided, in this embodiment by means of a three-position sprung rocker switch 12 set into the counter of a cashier's workstation. The switch 12, in this embodiment, has "open" "leave at rest" and "close" positions.

In the preferred embodiment, the system is provided with a controller 14, preferably microprocessor based, which controls the operation of the motor 16 and which receives directly the inputs from the switch 12. The Figure does not show the electrical connections of the controller 14 but it will be immediately apparent to the skilled person that these will be with the switch 12 or any other input and with the motor 16 and the power supply (not shown) to the motor.

Advantageously, the controller 14 is designed to control the speed of movement of the drawer 10 and also to detect any obstruction such as trapped fingers. In the preferred embodiment, this is achieved by measuring the current draw of the motor 16, which will be indicative of the load placed on the motor 16 and hence of the loading of the drawer 10. When the controller 14 detects and increase in current draw it is designed to increase the current/voltage supply to the motor 16 in a predetermined proportion intended to maintain a constant operating speed of the drawer. Thus, the drawer 10 moves at the same or substantially the same speed whether empty or fully loaded.

Detection of obstructions can be achieved by measuring changes in current draw. Any changes during movement of the drawer and/or above a set threshold will indicate that the drawer is being obstructed and cause the controller 14 to reduce the power supply to the motor 16 or in some cases to reverse the direction of rotation of the motor 14 (and thus direction of movement of the drawer 10) so that the operator can remove the obstruction.

In the preferred embodiment, the system is also provided with a speed control input for use by the operator. This may simply be in the form of a dial (for example a rotary potentiometer) on the workstation which allows the operator to choose a preferred drawer opening/closing speed. Where the controller 14 is provided, this will be programmed to maintain the speed of the motor at the selected speed at whatever loading of the drawer, that is it will adjust the current/voltage supply to the motor 16 to maintain the selected speed.

Limit or read switches (not shown) may be provided on the drawer 10 to determine its travel limits and to switch off the motor 16 at the end of the travel of the drawer 10. Alternatively, the drawer travel could be identified from the rotations of the motor 16 and be controlled by the controller 14.

Alternative arrangements would be to motorise the drawer slide directly and incorporate the limit controls on the drawer slide.

The drawer handle 24 could act as a switch to activate the control mechanism such that as soon as any force (in either direction) is put on the handle 24 the controller 14 detects this via corresponding movement of the motor 16 and activates the motor 16 as appropriate. Thus, as soon as the system detects any motor movement (for example by change in measured current) it would then trigger an increase in power supply to the motor 16 in the same direction and initiate the drawer assist operation.

In some embodiments, however, the handle 24 is omitted from the drawer 10 completely to prevent any arm/shoulder strain.

The preferred embodiments also incorporate security features, such as:

a) the drawer assist mechanism could be triggered from a computer terminal at the completion of a valid transaction which would require access to the drawer. A full audit trail could then be maintained;

b) time delay facilities and interlocks between drawers could be incorporated;

c) part opening drawers could easily be achieved so that a secret compartment is only revealed on certain user activity, such as different keystrokes from the PC or a separate key switch;

d) the motor could be used as the main locking device in that it is difficult to turn a motor which is not under power. The level of resistance would be significant, effectively locking the drawer.

In an alternative embodiment to those described above, the safety feature provided to prevent any possible injury by trapped fingers could be electro-mechanical, such that any pressure on the drawer edge activates a micro switch (not shown) which stops the motor 16. In some embodiments, the power supply to the motor 16 could be such that the motor 16 cannot generate enough force to cause injury if it closes whilst the user's fingers are trapped.

In an alternative embodiment to those described above, the motor 16 is mounted in the body of the pedestal and drive the drawer using a spring wheel, bearing on the base or side of the drawer to drive it in or out. In another arrangement, the motor would be mounted on the pedestal and linked by a wire to the body of the drawer. A worm gear would be required. An alternative arrangement would be to operate the drawer movement with a threaded spindle and gear on the drawer or incorporated into the slide. A motor with an integral drive spindle could also be used to operate on the slide or the drawer directly.

Of course, changes in loading can also be determined by detecting the change in speed of rotation of the motor 16 or movement of the drawer 10 form a preset speed.

CLAIMS

1. A drawer mechanism including a drawer unit for storage of items, a drawer housing within which the drawer unit can slide reciprocably, a motor coupled to the drawer unit and operable to slide the drawer unit reciprocably within the housing, and a control unit coupled to the motor and operable to actuate motor upon receipt of a predetermined input command.

2. A mechanism according to claim 1, wherein the predetermined input command is a secure command representative of receipt of an acceptable control input.

3. A mechanism according to claim 2, wherein the acceptable control input is a predetermined code or operation sequence.

4. A mechanism according to claim 1, 2 or 3, including means to provide a time delay and/or timed opening after which the drawer is closed again for security purposes.

5. A mechanism according to any preceding claim, including means to control the speed of opening and/or closing of the drawer unit.

6. A mechanism according to claim 5, wherein the control means includes means for detecting loading of the drawer and for adjusting power to the motor on the basis thereof.

7. A mechanism according to any preceding claim, including user operable means for changing the speed of movement of the drawer.

8. A drawer mechanism substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.

9. A cash service point including a drawer mechanism according to any preceding claim, the drawer unit being designed to hold cash in note and/or coin form.

INVESTOR IN PEOPLE

Application No: GB 0206826.0 **Examiner:** David P Maskery
Claims searched: 1 - 9 **Date of search:** 16 August 2002

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

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Int Cl (Ed.7): A47B, E05G (7/00) G07G (1/00)

Other: Online; EPODOC, JAPIO, WPI.

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
X, Y	GB 2359404 A	(CASH BASES) See Fig	X 1, Y 2, 3
X, Y	JP 3245292 A	(NIPPON ELECTRIC) See abstract	X 1, 5, 6 Y 2, 3
X, Y	JP 1185996 A	(NIPPON ELECTRIC) See abstract and figs	X 1, Y 2, 3
X, Y	US 5802991	(BROWN) See whole document	X 1, 9 Y 2, 3
Y	US 5158347	(WARREN) See column 2 line 57 - 67	2, 3
X, Y	US 3963900	(FUJITSU) See column 4 lines 26 - 53 and column 6 lines 39 - 48	X 1 - 3
X, Y	US 3682113	(MEILINK) See figs	X 1, 9 Y 2, 3
X, Y	US 3390833	(HARRIS) See figs	X 1, 9 Y 2, 3
X, Y	US 2730053	(ELLITHORPE) See figs and column 2 line 38 and column 6 lines 40 - 64.	X 1, 4, 9 Y 2, 3

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.